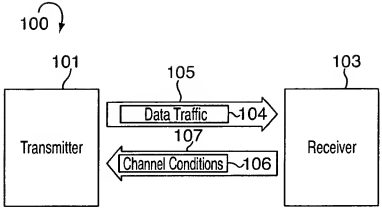

100
101
105
103
Transmitter
Data Traffic
104
107
Channel Conditions
106
Receiver

FIG. 1

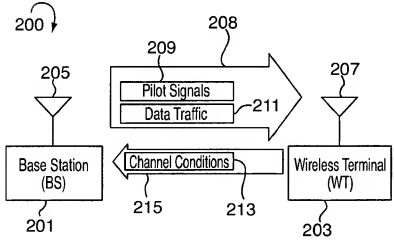

200
208
209
205
207
Pilot Signals
Data Traffic
211
Base Station
(BS)
Channel Conditions
Wireless Terminal
(WT)
215
213
201
203

FIG. 2

FIG. 3

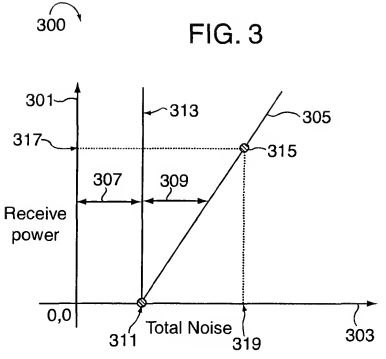
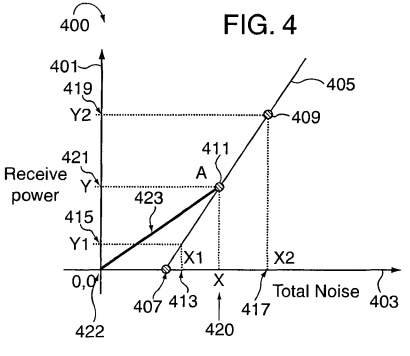

300
301
313
305
317
315
307
309
Receive
power
0,0
311
Total Noise
319
303

FIG. 4


400
401
405
419
Y2
409
411
421
A
Receive
power
Y
423
415
Y1
X1
X2
0,0
X
Total Noise
403
407
413
417
422
420

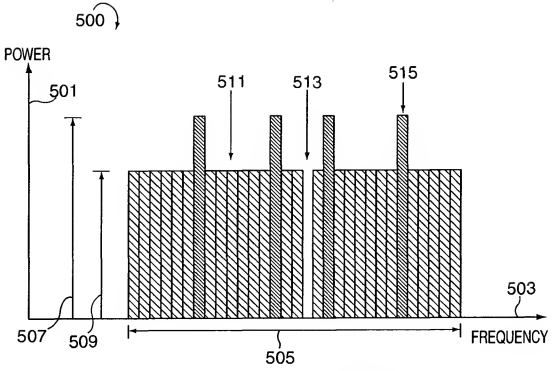

500
POWER
501
511
513
515
503
507
509
505
FREQUENCY

FIG. 5

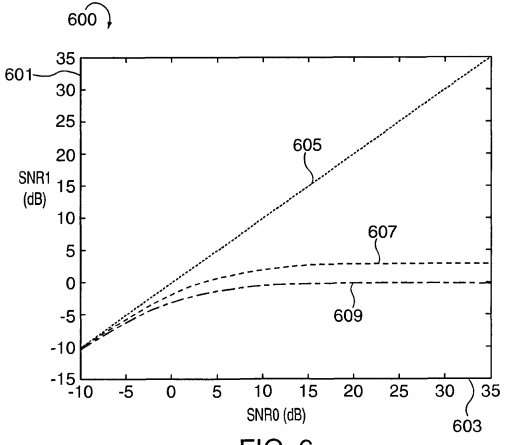

600
601
35
30
25
20
15
10
5
0
-5
-10
-15
SNR1 (dB)
605
607
609
-10
-5
0
5
10
15
20
25
30
35
SNR0 (dB)
603

FIG. 6

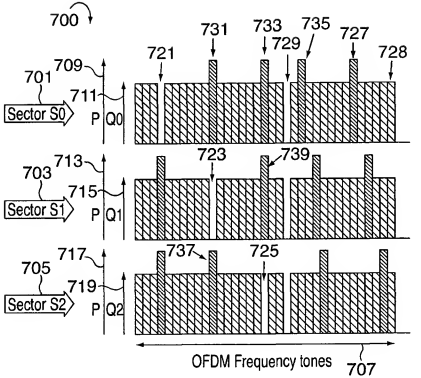

700
731
733
735
729
727
721
728
709
701
711
Sector S0
P
Q0
723
739
713
703
715
Sector S1
P
Q1
737
725
717
705
719
Sector S2
P
Q2
OFDM Frequency tones
707

FIG. 7

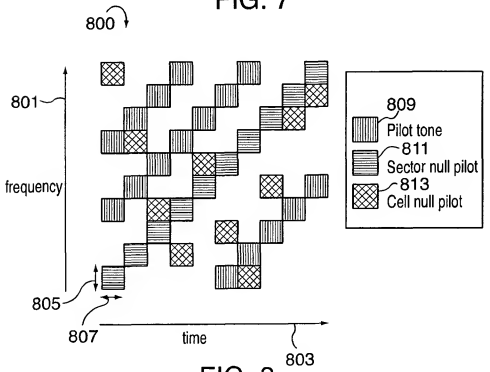

800
801
frequency
805
807
time
803
809
Pilot tone
811
Sector null pilot
813
Cell null pilot

FIG. 8

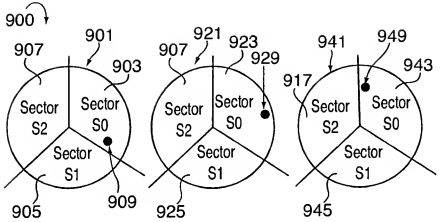

900
901
907
903
Sector S2
Sector S0
Sector S1
905
909
921
907
923
929
Sector S2
Sector S0
Sector S1
925
941
949
917
943
Sector S2
Sector S0
Sector S1
945

FIG. 9

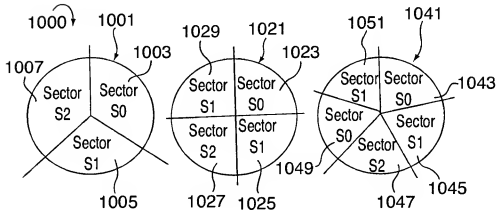

1000
1001
1007
1003
Sector S2
Sector S0
Sector S1
1005
1029
1021
1023
Sector S1
Sector S0
Sector S2
Sector S1
1027
1025
1051
1041
Sector S1
Sector S0
1043
Sector S0
Sector S1
Sector S2
1049
1045
1047

FIG. 10

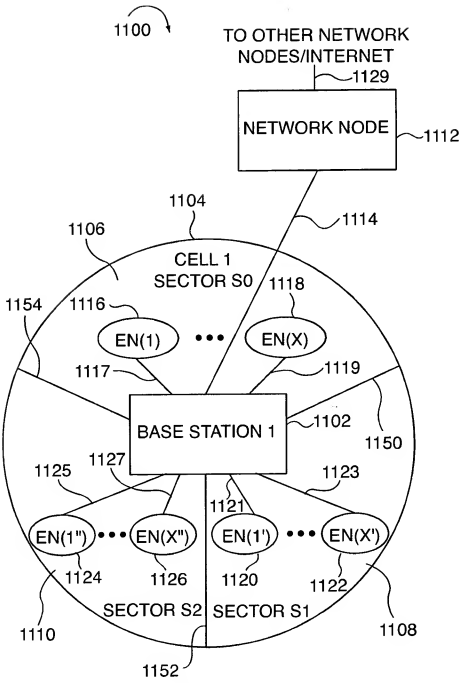

1100
TO OTHER NETWORK NODES/INTERNET
1129
NETWORK NODE
1112
1104
1114
1106
CELL 1
SECTOR S0
1118
1154
1116
EN(1)
EN(X)
1117
1119
BASE STATION 1
1102
1150
1127
1125
1123
1121
EN(1")
EN(X")
EN(1')
EN(X')
1124
1126
1120
1122
SECTOR S2
SECTOR S1
1110
1108
1152

FIG. 11

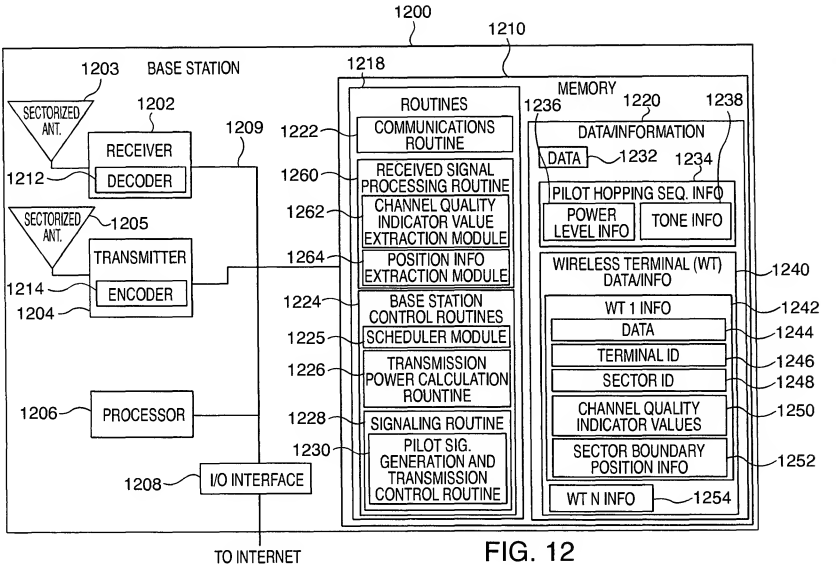

1200
1210
1203
BASE STATION
1218
SECTORIZED ANT.
1202
RECEIVER
1209
1212
DECODER
SECTORIZED ANT.
1205
TRANSMITTER
1214
ENCODER
1204
1206
PROCESSOR
1208
I/O INTERFACE
TO INTERNET
ROUTINES
1222
COMMUNICATIONS ROUTINE
1260
RECEIVED SIGNAL PROCESSING ROUTINE
1262
CHANNEL QUALITY INDICATOR VALUE EXTRACTION MODULE
1264
POSITION INFO EXTRACTION MODULE
1224
BASE STATION CONTROL ROUTINES
1225
SCHEDULER MODULE
1226
TRANSMISSION POWER CALCULATION ROUNTINE
1228
SIGNALING ROUTINE
1230
PILOT SIG. GENERATION AND TRANSMISSION CONTROL ROUTINE
MEMORY
1236
1220
1238
DATA/INFORMATION
DATA
1232
1234
PILOT HOPPING SEQ. INFO
POWER LEVEL INFO
TONE INFO
WIRELESS TERMINAL (WT) DATA/INFO
1240
WT 1 INFO
1242
DATA
1244
TERMINAL ID
1246
SECTOR ID
1248
CHANNEL QUALITY INDICATOR VALUES
1250
SECTOR BOUNDARY POSITION INFO
1252
WT N INFO
1254

FIG. 12

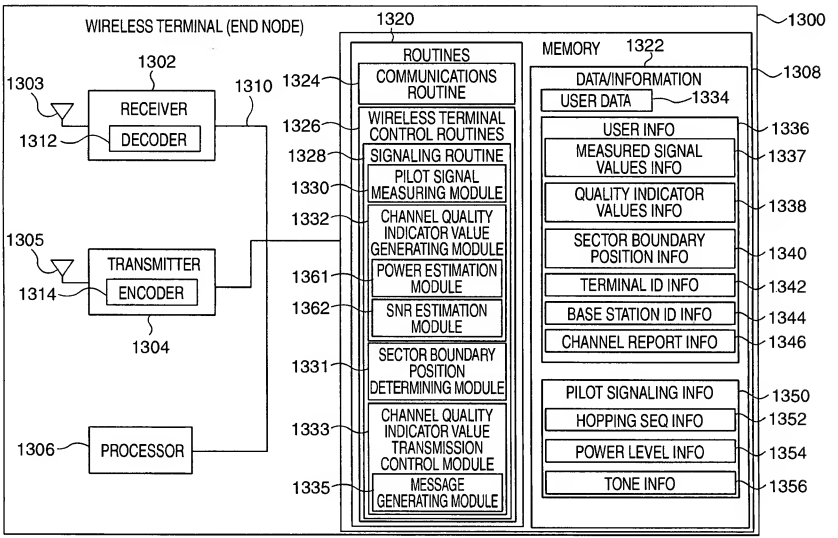

WIRELESS TERMINAL (END NODE)
1300
1320
ROUTINES
MEMORY
1322
1302
1303
RECEIVER
1310
1312
DECODER
1324
COMMUNICATIONS ROUTINE
1326
WIRELESS TERMINAL CONTROL ROUTINES
1328
SIGNALING ROUTINE
1330
PILOT SIGNAL MEASURING MODULE
1332
CHANNEL QUALITY INDICATOR VALUE GENERATING MODULE
1361
POWER ESTIMATION MODULE
1362
SNR ESTIMATION MODULE
1331
SECTOR BOUNDARY POSITION DETERMINING MODULE
1333
CHANNEL QUALITY INDICATOR VALUE TRANSMISSION CONTROL MODULE
1335
MESSAGE GENERATING MODULE
1308
DATA/INFORMATION
USER DATA
1334
USER INFO
1336
MEASURED SIGNAL VALUES INFO
1337
QUALITY INDICATOR VALUES INFO
1338
SECTOR BOUNDARY POSITION INFO
1340
TERMINAL ID INFO
1342
BASE STATION ID INFO
1344
CHANNEL REPORT INFO
1346
PILOT SIGNALING INFO
1350
HOPPING SEQ INFO
1352
POWER LEVEL INFO
1354
TONE INFO
1356
1305
TRANSMITTER
1314
ENCODER
1304
1306
PROCESSOR

FIG. 13

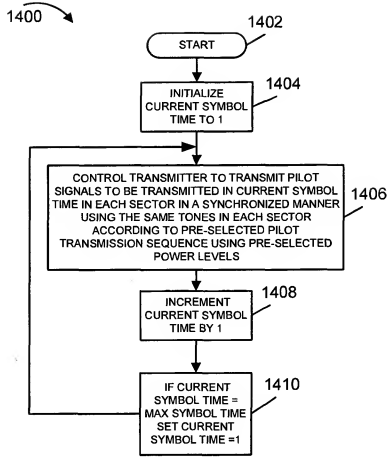

1400
1402
START
1404
INITIALIZE CURRENT SYMBOL TIME TO 1
CONTROL TRANSMITTER TO TRANSMIT PILOT SIGNALS TO BE TRANSMITTED IN CURRENT SYMBOL TIME IN EACH SECTOR IN A SYNCHRONIZED MANNER USING THE SAME TONES IN EACH SECTOR ACCORDING TO PRE-SELECTED PILOT TRANSMISSION SEQUENCE USING PRE-SELECTED POWER LEVELS
1406
1408
INCREMENT CURRENT SYMBOL TIME BY 1
1410
IF CURRENT SYMBOL TIME = MAX SYMBOL TIME SET CURRENT SYMBOL TIME =1

Fig. 14

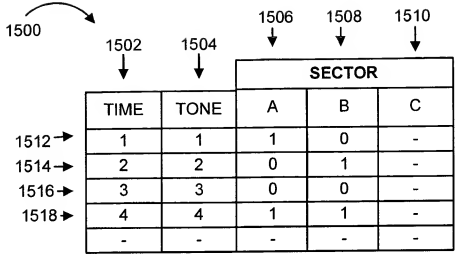


Fig. 15

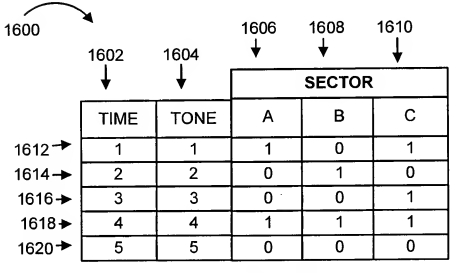


Fig. 16

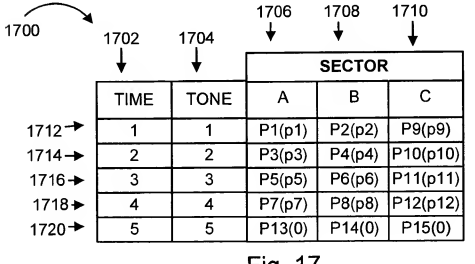
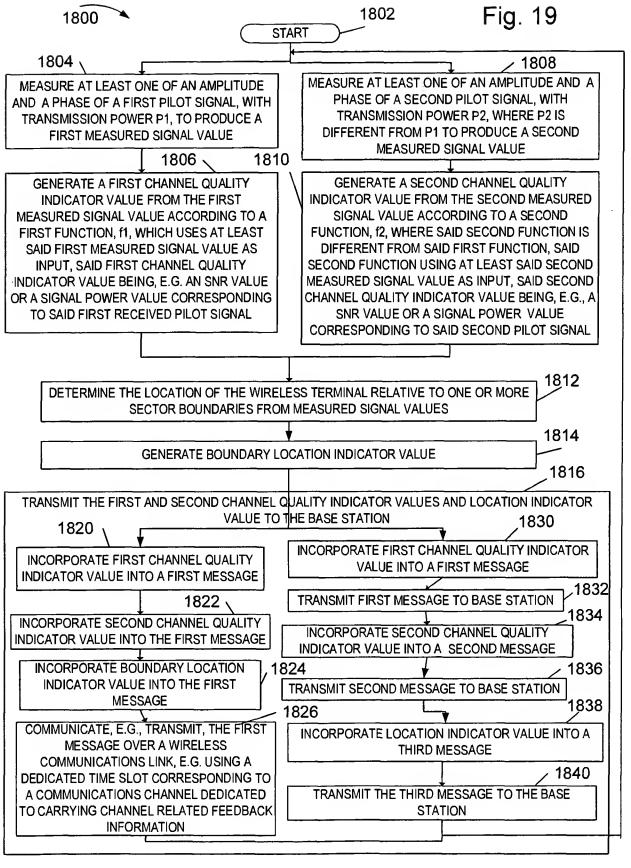


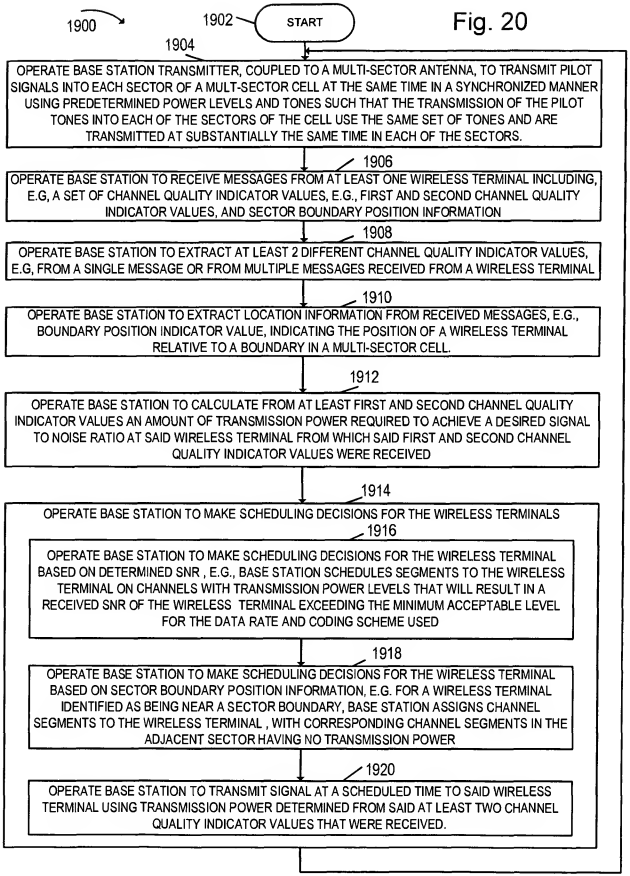
Fig. 17

1750

1 SYMBOL TIME			
TONE	A	B	C
1	0	0	0
2	1	1	0
3	1	0	1
4	0	1	1
5	1	D	D
6	1	D	D
7	D	1	D
8	D	1	D
9	D	D	1
10	D	D	1

Fig. 18


1800
1802
START
Fig. 19
1804
MEASURE AT LEAST ONE OF AN AMPLITUDE AND A PHASE OF A FIRST PILOT SIGNAL, WITH TRANSMISSION POWER P1, TO PRODUCE A FIRST MEASURED SIGNAL VALUE
1808
MEASURE AT LEAST ONE OF AN AMPLITUDE AND A PHASE OF A SECOND PILOT SIGNAL, WITH TRANSMISSION POWER P2, WHERE P2 IS DIFFERENT FROM P1 TO PRODUCE A SECOND MEASURED SIGNAL VALUE
1806
GENERATE A FIRST CHANNEL QUALITY INDICATOR VALUE FROM THE FIRST MEASURED SIGNAL VALUE ACCORDING TO A FIRST FUNCTION, f1, WHICH USES AT LEAST SAID FIRST MEASURED SIGNAL VALUE AS INPUT, SAID FIRST CHANNEL QUALITY INDICATOR VALUE BEING, E.G. AN SNR VALUE OR A SIGNAL POWER VALUE CORRESPONDING TO SAID FIRST RECEIVED PILOT SIGNAL
1810
GENERATE A SECOND CHANNEL QUALITY INDICATOR VALUE FROM THE SECOND MEASURED SIGNAL VALUE ACCORDING TO A SECOND FUNCTION, f2, WHERE SAID SECOND FUNCTION IS DIFFERENT FROM SAID FIRST FUNCTION, SAID SECOND FUNCTION USING AT LEAST SAID SECOND MEASURED SIGNAL VALUE AS INPUT, SAID SECOND CHANNEL QUALITY INDICATOR VALUE BEING, E.G., A SNR VALUE OR A SIGNAL POWER VALUE CORRESPONDING TO SAID SECOND PILOT SIGNAL
1812
DETERMINE THE LOCATION OF THE WIRELESS TERMINAL RELATIVE TO ONE OR MORE SECTOR BOUNDARIES FROM MEASURED SIGNAL VALUES
1814
GENERATE BOUNDARY LOCATION INDICATOR VALUE
1816
TRANSMIT THE FIRST AND SECOND CHANNEL QUALITY INDICATOR VALUES AND LOCATION INDICATOR VALUE TO THE BASE STATION
1820
INCORPORATE FIRST CHANNEL QUALITY INDICATOR VALUE INTO A FIRST MESSAGE
1822
INCORPORATE SECOND CHANNEL QUALITY INDICATOR VALUE INTO THE FIRST MESSAGE
1824
INCORPORATE BOUNDARY LOCATION INDICATOR VALUE INTO THE FIRST MESSAGE
1826
COMMUNICATE, E.G., TRANSMIT, THE FIRST MESSAGE OVER A WIRELESS COMMUNICATIONS LINK, E.G. USING A DEDICATED TIME SLOT CORRESPONDING TO A COMMUNICATIONS CHANNEL DEDICATED TO CARRYING CHANNEL RELATED FEEDBACK INFORMATION
1830
INCORPORATE FIRST CHANNEL QUALITY INDICATOR VALUE INTO A FIRST MESSAGE
1832
TRANSMIT FIRST MESSAGE TO BASE STATION
1834
INCORPORATE SECOND CHANNEL QUALITY INDICATOR VALUE INTO A SECOND MESSAGE
1836
TRANSMIT SECOND MESSAGE TO BASE STATION
1838
INCORPORATE LOCATION INDICATOR VALUE INTO A THIRD MESSAGE
1840
TRANSMIT THE THIRD MESSAGE TO THE BASE STATION


1900
1902
START
Fig. 20
1904
OPERATE BASE STATION TRANSMITTER, COUPLED TO A MULTI-SECTOR ANTENNA, TO TRANSMIT PILOT SIGNALS INTO EACH SECTOR OF A MULT-SECTOR CELL AT THE SAME TIME IN A SYNCHRONIZED MANNER USING PREDETERMINED POWER LEVELS AND TONES SUCH THAT THE TRANSMISSION OF THE PILOT TONES INTO EACH OF THE SECTORS OF THE CELL USE THE SAME SET OF TONES AND ARE TRANSMITTED AT SUBSTANTIALLY THE SAME TIME IN EACH OF THE SECTORS.
1906
OPERATE BASE STATION TO RECEIVE MESSAGES FROM AT LEAST ONE WIRELESS TERMINAL INCLUDING, E.G, A SET OF CHANNEL QUALITY INDICATOR VALUES, E.G., FIRST AND SECOND CHANNEL QUALITY INDICATOR VALUES, AND SECTOR BOUNDARY POSITION INFORMATION
1908
OPERATE BASE STATION TO EXTRACT AT LEAST 2 DIFFERENT CHANNEL QUALITY INDICATOR VALUES, E.G, FROM A SINGLE MESSAGE OR FROM MULTIPLE MESSAGES RECEIVED FROM A WIRELESS TERMINAL
1910
OPERATE BASE STATION TO EXTRACT LOCATION INFORMATION FROM RECEIVED MESSAGES, E.G., BOUNDARY POSITION INDICATOR VALUE, INDICATING THE POSITION OF A WIRELESS TERMINAL RELATIVE TO A BOUNDARY IN A MULTI-SECTOR CELL.
1912
OPERATE BASE STATION TO CALCULATE FROM AT LEAST FIRST AND SECOND CHANNEL QUALITY INDICATOR VALUES AN AMOUNT OF TRANSMISSION POWER REQUIRED TO ACHIEVE A DESIRED SIGNAL TO NOISE RATIO AT SAID WIRELESS TERMINAL FROM WHICH SAID FIRST AND SECOND CHANNEL QUALITY INDICATOR VALUES WERE RECEIVED
1914
OPERATE BASE STATION TO MAKE SCHEDULING DECISIONS FOR THE WIRELESS TERMINALS
1916
OPERATE BASE STATION TO MAKE SCHEDULING DECISIONS FOR THE WIRELESS TERMINAL BASED ON DETERMINED SNR , E.G., BASE STATION SCHEDULES SEGMENTS TO THE WIRELESS TERMINAL ON CHANNELS WITH TRANSMISSION POWER LEVELS THAT WILL RESULT IN A RECEIVED SNR OF THE WIRELESS TERMINAL EXCEEDING THE MINIMUM ACCEPTABLE LEVEL FOR THE DATA RATE AND CODING SCHEME USED
1918
OPERATE BASE STATION TO MAKE SCHEDULING DECISIONS FOR THE WIRELESS TERMINAL BASED ON SECTOR BOUNDARY POSITION INFORMATION, E.G. FOR A WIRELESS TERMINAL IDENTIFIED AS BEING NEAR A SECTOR BOUNDARY, BASE STATION ASSIGNS CHANNEL SEGMENTS TO THE WIRELESS TERMINAL , WITH CORRESPONDING CHANNEL SEGMENTS IN THE ADJACENT SECTOR HAVING NO TRANSMISSION POWER
1920
OPERATE BASE STATION TO TRANSMIT SIGNAL AT A SCHEDULED TIME TO SAID WIRELESS TERMINAL USING TRANSMISSION POWER DETERMINED FROM SAID AT LEAST TWO CHANNEL QUALITY INDICATOR VALUES THAT WERE RECEIVED.